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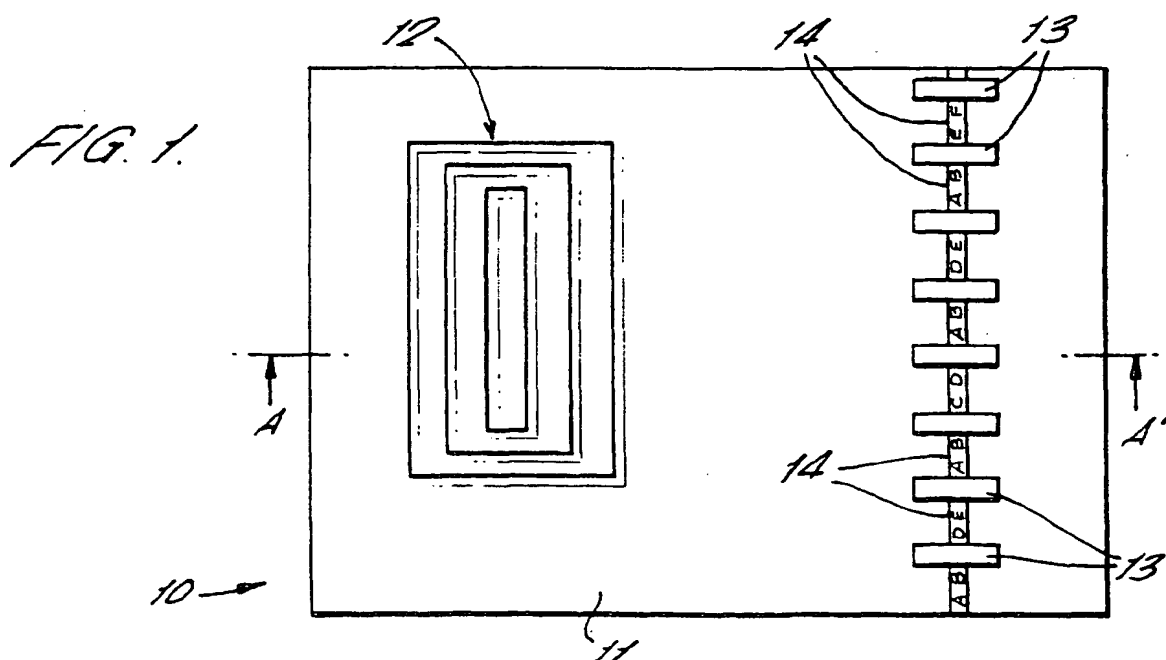
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(54) An adhesive label

(57) An adhesive label (10;35;45), as illustrated in Figure 2, which comprises a base layer (11) having an adhesive (20) applied to one side (21) of the base layer (11); the base layer (11) incorporating at least one watermark feature (12) said watermark feature having a plurality of first (22) and second (23) areas which appear lighter and darker respectively than the base layer (11)

when the adhesive label (10;35;45) is viewed in transmitted light, the perceived appearance of the first (22) and second (23) areas changing when the adhesive label (10;35;45) is applied, in use, to an opaque background of a shade or colour darker than the base layer (11) so that the first (22) and second (23) areas appear darker and lighter respectively.



Description

The invention relates to an adhesive label and in particular to an adhesive label which can be used for security applications, such as an authentication certificate, means of identification or the like as proof of the authenticity or origin of an article to which it is adhered.

Documents of value and means of identification, such as banknotes, passports, identification cards, certificates and the like, are vulnerable to copying or counterfeiting. The increasing popularity of colour photocopiers, electronic scanning and other imaging systems, and the improving technical quality of colour photocopiers, has led to an increase in the counterfeiting of such documentation. There is, therefore, a need to improve the security features of such documentation, or paper, to add additional security features or to enhance the perceptions and resistance of simulation to existing features. Steps have already been taken to introduce optically variable features into such documentation which cannot be reproduced by a photocopier or an electronic scanner. There is thus a demand to introduce features which are discernible by the naked eye but "invisible" to, or viewed differently by, a photocopier or scanner. Since the photocopying process typically involves reflecting high energy light on an original document containing the image to be copied, one solution is to incorporate one or more features into the document which have a different perception in reflected and transmitted light. Such examples of such security features include watermarks, embedded security threads, fluorescent pigments and the like.

Unfortunately, for documents containing these security features the ability to inspect the documents in both reflected and transmitted light is necessary to identify the differences. These types of features have therefore not been considered to be suitable for applications where only one side of the document can be viewed in reflected light, e.g. on a label stuck to another article.

It is therefore an object of the present invention to provide a label containing one or more security features which can be applied to an article so that the security feature can be identified before application and *in situ* from one side of the document alone.

According to the invention there is provided an adhesive label comprising a base layer having an adhesive applied to one side of the base layer, characterised in that the base layer incorporates at least one watermark feature, said watermark feature having a plurality of first and second areas which appear lighter and darker respectively than the base layer when the label is viewed in transmitted light, the perceived appearance of said first and second areas changing when the label is applied, in use, to an opaque background of a darker shade or colour than the base layer so that the first and second areas appear darker and lighter respectively.

Contrary to all technical prejudices, it has been found that when an adhesive label is made with a base

layer containing a watermark and applied to a background of a darker or different colour to that of the base layer there is an unexpected and surprising effect in that the watermark is visible in a modified form in reflected light. Such watermarks can also be detected by touch as there is a surprising increase in the perceived variations in the surface of the adhesive label in the area of the watermark, thus providing an additional security check. Thus an adhesive label according to the present invention has wide-ranging security applications as it can be checked for authenticity before application by viewing in both transmitted and reflected light, and then *in situ* by viewing in reflected light only and by touch. An adhesive label containing such a watermark feature provides a high degree of security because it cannot be photocopied even if the adhesive label is removed from the article to which it is attached.

Preferably the adhesive label further includes a backing sheet to protect the adhesive. The backing sheet may be clear, translucent or light impermeable. The adhesive may be clear or translucent or coloured and of a different colour to the colour of the base layer.

The adhesive label preferably further includes a security thread embedded partially or wholly within the base layer and/or one or more surface security features.

The base layer is preferably of paper.

In a preferred embodiment of the invention the base layer is a two-ply structure formed from two substrates, a first substrate containing the watermark feature.

The first substrate is preferably of paper. The second substrate is preferably coloured. The second substrate may be of a material other than paper.

Preferably the thickness of the paper fibres at different locations within the watermark feature is up to 20% less than that of the base layer in the thinner part and up to 20% greater than that of the base layer in the thicker part.

The density of the paper fibres at different locations within the watermark feature is preferably up to 20% greater than the density of the base layer in the denser areas and up to 20% less in the density of the base layer in the less dense areas.

The constituents of the base layer may be natural, synthetic or a combination of natural and synthetic.

The watermark feature preferably provides a tactile effect when the label is applied, in use, to a background.

A preferred embodiment of the present invention will now be described in detail, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a schematic plan view representation of an adhesive label according to the present invention; Figure 2 is a cross-section through the adhesive label of Figure 1, taken along the line A-A' in the direction of the arrows;

Figure 3 is a cross-section (corresponding to the cross-section of Figure 2) of the adhesive label of Figures 1 and 2 with a backing paper attached;

Figure 4 is a cross-section through a second embodiment of an adhesive label; and

Figure 5 is a cross-section through a third embodiment of label.

In Figures 1 and 2 there is shown an adhesive label 10 formed from a paper base layer 11. The paper base layer 11 contains one or more watermark features 12, 13. Two such features are illustrated in Fig. 1, one being a pictorial image 12 (of an abstract rectangular pattern) and the other watermark bars 13. The adhesive label 10 has an adhesive layer 20 on one surface 21, hereinafter referred to as the rear surface 21 of the adhesive label 10.

The watermarked paper base layer 11 may be made using known papermaking machines such as a cylinder mould or Fourdrinier machine or it may even be hand-made. A range of fibre types can be used in the making of such paper including synthetic or natural fibres or a mixture of both. The actual preparation of the fibre is unrestricted depending on what effect it is wished to produce in the finished paper. This is contrary to the accepted procedures for making security paper for documents such as banknotes, passports, identification cards and so on which needs to be hardwearing, resilient and self-supporting.

A watermark is created by varying the density of paper fibres so that in some areas (e.g. 23) the fibres are denser and in others (e.g. 22) less dense than that of the base paper layer 11. When viewed in transmitted light the less dense areas are lighter and the denser areas darker than the base paper, and the contrasts can be seen very clearly.

The actual grammage of the paper within the watermark 12, 13 thus has a significant effect on the clarity of the watermark 12, 13 especially when included in an adhesive label 10 applied to a background. Whilst the varying density of the paper fibres affects the visibility of the watermark 12, 13, in both reflected and transmitted light the varying thickness of the paper has an effect on the tactility of the watermark 12, 13 whereby raised or thicker areas (e.g. 23) can be felt where the fibres are denser. The density of fibres can be varied by varying the relative depth in the watermarking dies so that the relative quantity of fibres deposited in different areas of the watermark differ dramatically. The density of the paper can also be affected by adding other components to the papermaking furnish, such as fillers which change the opacity of the paper. Thus areas (e.g. 23) with more fibres made from a furnish including fillers will appear much more opaque than those areas with fewer such filler fibres (e.g. 22) or indeed paper without such fillers. Colouring the paper base layer 11 also affects the visibility of the watermark and the depth of clarity between the thick and thin areas.

It is envisaged that the thickness of the paper base layer 11 for making an adhesive label 10 according to the present invention will be in the range of 70 to 150

microns and preferably 115 microns. The thicknesses of the paper within the watermark could vary by plus or minus 20% of the base thickness, i.e. up to 20% thinner within the lighter areas (e.g. 22) and up to 20% thicker in the darker areas (e.g. 23). This range of variation is usually avoided in watermarks in security paper as the paper is weakened by such variation and processes such as calendaring or intaglio printing can damage the paper or the watermark image causing pin holing or crushing. Paper having watermarks with such a varying range of thicknesses could not be used for banknotes or other similar security documentation which must be hardwearing and resilient due to their continuous handling. For an adhesive label, however, this is not a disadvantage as the adhesive label 10 is supported by its backing, before application, or by the article to which it is adhered, after application.

Furthermore, in an attempted removal of such an adhesive label 10, this weakness in the paper 11 is likely to lead to tearing, thus providing a tamper-proof feature.

In one specific example of the present invention, the preferred grammage of the paper base layer 11 is 90gsm. The denser areas 23 of the watermark feature 12, 13 are 20% more dense than the non-watermark areas of the paper base layer 11 and the lighter areas 22 of the watermark feature 12 are 20% less dense than the non-watermark areas of the paper base layer 11. However, the grammage of the paper base layer 11 may vary from 55 to 120gsm.

The use of pictorial images as watermarks is fairly common in many security documents and the rectangular device 12 shown in Figure 1 could be easily replaced by a representation of a head, an animal or any pictorial image whatsoever. The other type of watermark feature shown in Fig. 1, the watermark bars 13, are created when paper is made with a security thread 14 embedded within the paper. Such paper can be made by a method such as that described in patent EP 0059056, where the security thread is exposed at regular intervals in windows in the surface of the paper. In the watermark bar areas 13 between the windows, the fibres are denser than in the non-watermark regions of the base paper layer 11. These can be made to appear as regular or irregular bars as preferred. The watermark bars, when the adhesive label 10 is applied to a supporting surface, reflect the original colour of the adhesive label 10, whereas the base paper layer 11 takes up the colour of the background.

The adhesive layer 20 on the back of the adhesive label 10 can be a layer of any suitable adhesive applied in a variety of forms, including a water activated gum, a self-adhesive coating with a protective silicone backing, a double-sided tape or sheet. The adhesive itself may be ultra violet curable, pressure sensitive, permanent or a repositionable adhesive. The adhesive composition dictates the thickness of the adhesive.

In one embodiment of the invention seen in Figure 3, the label 10 has a backing paper 25 which is used to

protect the label 10 before it is applied to the article. A clear or highly translucent backing may be used, then this enables the watermarks 12, 13 and any other security feature to be checked in transmitted as well as reflected light before the backing paper 25 is removed and before application of the label. However, a non-translucent backing paper 25 may also be used, which requires the removal of the backing paper 25 before the label 10 can be checked before application.

When the label 10 is applied to an article which provides a darker background to that of the base paper 11, there is a significant change in the appearance of the watermark features 12, 13. The areas (e.g. 22) which appear, in transmitted light, very light become dark and the darker areas (e.g. 23) appear whiter. Thus a negative watermark changes to a positive image and a positive watermark changes to a negative image. When the adhesive label 10 is applied to an article, the paper base layer 11 tends to take up the colour of the background to a certain degree. The less dense areas (e.g. 22) of the watermarks 12, 13 take up the background colour to a greater degree and the dense areas (e.g. 23) much less. Thus contrary to expectation the watermark images 12 and 13 are clear. The darker the background to which the adhesive label 10 is applied, the clearer the watermark features 12, 13 are. Thus the adhesive label 10 according to the present invention provides a two-fold test for its authentication before it is applied to an article, as well as providing security features which can be checked once applied. These include the visible watermark image when examined in reflected light and the tactile effect resulting from the varying thicknesses of the paper within the watermark. This tactile effect is more significant when the surface of the adhered label 10 is felt than when both sides of paper containing a watermark can be felt.

When an adhesive label 10 is applied to a coloured surface, the change to the watermark image is more significant in that the thinner areas of paper allow more colour to show through whereas the thicker areas of paper remain the colour of the base paper layer 11. The intensity of the colour of the background enhances the intensity of the effect. A range of random colours beneath the watermark features 12, 13 can cause a range of pastel colours to be transmitted which is particularly difficult to counterfeit.

It should be noted that if an adhesive label 10 is applied to a background which is the same colour as the base paper 11, then the watermark feature 12 becomes invisible and cannot be viewed in reflected light. However, the tactile effect still remains. Thus, for applications where the article to which the adhesive label 10 is to be applied may be of a similar colour to the base paper 11, the adhesive layer 20 may be coloured or ultra violet fluorescent.

Alternatively a re-positionable adhesive may be used to allow the adhesive label 10 to be removed and checked in transmitted light. This embodiment of the invention

may be unsuitable for some applications, such as certificates of authenticity, but may have other applications.

Different types of watermark features 12, 13 have different advantages. A pictorial image 12 can be very detailed and complex which significantly reduces the risk of counterfeiting. However the watermark bars 13 provide a more startling visible effect and can be verified at a greater distance than the more subtle pictorial image 12. The watermark bars 12, 13 also provide a greater tactile effect than the pictorial image 12. It is thus envisaged that, although the adhesive label 10 may have just one watermark feature, a combination of different watermark features may be used to provide enhanced security.

The base paper layer 11 of the adhesive label 10 may be single or two-ply paper. Two-ply paper is generally made using two separate vats of papermaking furnish which produce two substrates which are compressed together to form a finished paper. In a second embodiment of the present invention illustrated in Figure 4, twin-ply paper is used, where one substrate 30 is made from a non-coloured furnish, this being the substrate which contains the watermark feature and a second substrate 31 is made from a coloured furnish. An adhesive label 35 made from such two colour paper is particularly suitable for applications where the background colour of the article to which the adhesive label 35 is applied is likely to be the same as the uncoloured part of the base paper. This ensures that the watermark is visible once the adhesive label 35 has been applied to the article.

A two-ply adhesive label 45 can also be made according to the present invention in which second-ply 40 (see Figure 5) which does not include the watermark is not made from paper but could be a clear or a coloured film (e.g. of plastic).

The present invention is also highly compatible with many other security features to enhance the security of the adhesive label 10. For example, a wide range of different types of security thread can be used, including holographic threads, demetallised threads, demetallised holographic threads, fluorescent threads, thermochromic threads, coloured/metallised threads, machine-readable threads, optically variable threads and micro-printed threads. It is significant to note that in adhesive labels containing demetallised threads, the demetallised areas can be seen much more clearly when the adhesive labels are applied to a darker background. The demetallised (negative) areas become positive where the colour of the background comes through.

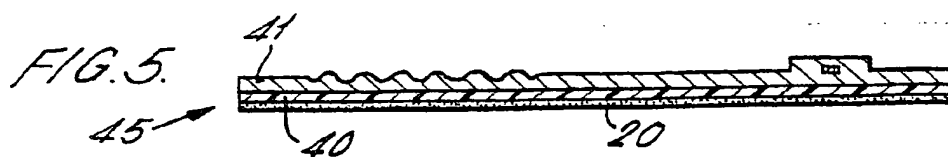
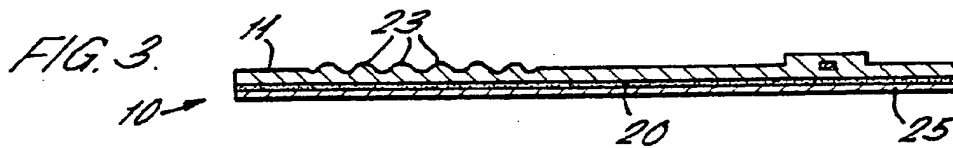
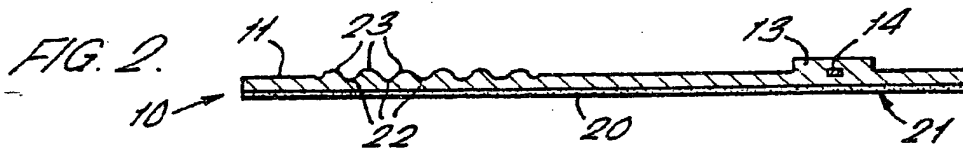
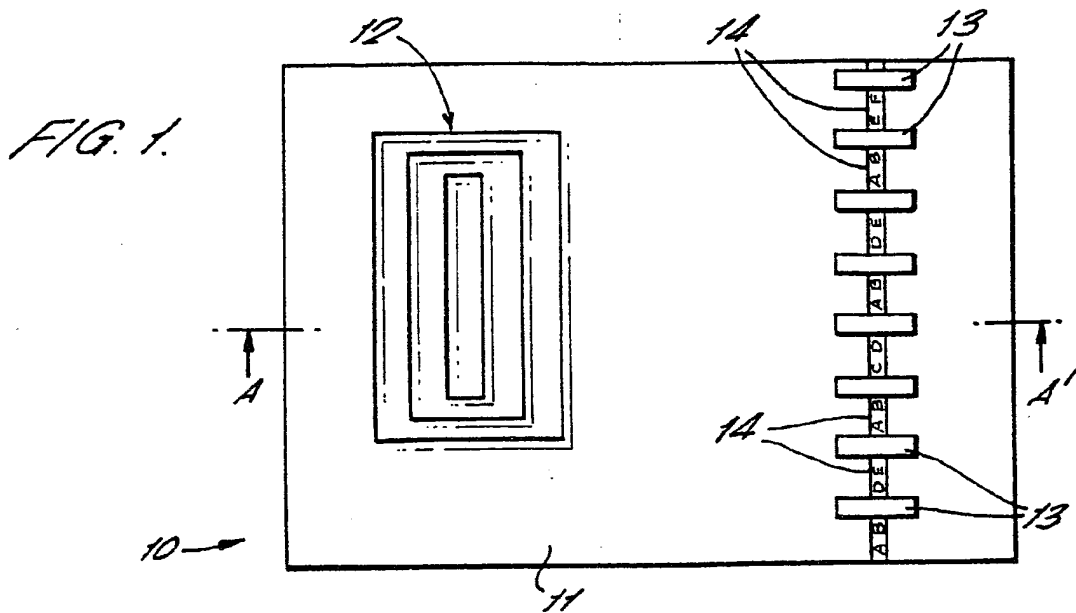
Other surface features may also be included such as planchette bands, fibre bands, iridescent coatings and transparentising coatings and print.

Adhesive labels 10 according to the present invention are also compatible within any known forms of printing such as intaglio, flexo-gravure, ink jet, hot foil stamping and so on. The adhesive labels 10 may also have a glossy or other finish which is clear or translucent.

Such adhesive labels 10 may have a wide range of uses especially as certificates of origin or authentication, and in particular in fields where counterfeiting of the products to which the adhesive labels 10 are attached is or may be rife, such as high value added or fast moving consumer goods.

Claims

1. An adhesive label (10;35;45) comprising a base layer (11) having an adhesive (20) applied to one side of the base layer (11), characterised in that the base layer (11) incorporates at least one watermark feature (12), said watermark feature (12) having a plurality of first (22) and second (23) areas which appear lighter and darker respectively than the base layer (11) when the adhesive label (10;35;45) is viewed in transmitted light, the perceived appearance of said first (22) and second (23) areas changing when the adhesive label (10;35;45) is applied, in use, to an opaque background of a shade or colour darker than the base layer (11) so that the first (22) and second (23) areas appear darker and lighter respectively.
2. An adhesive label (10;35;45) as claimed in claim 1 in which the adhesive label (10;35;45) further includes a backing sheet (25) to protect the adhesive (20).
3. An adhesive label (10;35;45) as claimed in claim 2 in which the backing sheet (25) is clear or translucent.
4. An adhesive label (10;35;45) as claimed in claim 2 in which the backing sheet (25) is not light-permeable.
5. An adhesive label (10;35;45) as claimed in claim 1 in which the adhesive (20) is coloured and of a different colour to the colour of the base layer (11).
6. An adhesive label as claimed in claim 1 further comprising a security thread (14) embedded partially or wholly within the base layer (11).
7. An adhesive label (10;35;45) as claimed in claim 1 further comprising one or more surface security features (13).
8. An adhesive label (10;35;45) as claimed in claim 1 in which the base layer (11) is of paper.
9. An adhesive label (10;35;45) as claimed in claim 1 in which the base layer is a two-ply structure formed from two substrates (30, 31; 40, 41), a first substrate (30; 41) containing the watermark feature.
10. An adhesive label (10;35;45) as claimed in claim 9, in which the first substrate (30) is of paper.
11. An adhesive label (10;35;45) as claimed in claim 9 in which the second substrate (31; 40) is coloured.
12. An adhesive label (10;35;45) as claimed in claim 9, in which the second substrate (40) is not of paper.
13. An adhesive label (10;35;45) as claimed in claim 1 in which the thickness of the paper fibres at different locations within the watermark feature (12) is up to 20% less than that of the base layer (11) in the thinner parts (22) and up to 20% greater than that of the base layer (11) in the thicker parts (23).
14. An adhesive label (10;35;45) as claimed in claim 1 in which the density of the paper fibres at different locations within the watermark feature (12) is up to 20% greater than the density of the base layer (11) in the denser areas (23) and up to 20% less than the density of the base layer (11) in the less dense areas (22).
15. An adhesive label as claimed in claim 1 in which the constituents of the base layer (11) are natural, synthetic or a combination of natural and synthetic.
16. An adhesive label (10;35;45) as claimed in claim 1 in which the watermark feature (12) provides a tactile effect when the adhesive label (10;35;45) is applied in use, to a background.





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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 8122

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB-A-2 268 906 (PROTALS LIMITED) ---		G09F3/02
A	DE-A-43 14 579 (SCHMIDT) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G09F B42D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 February 1997	Examiner Loncke, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure F : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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